

Energy Efficiency in Residence Halls at Michigan State University Rebuild Michigan Research Project

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**Technical Workshop
Lansing, Michigan**

Project Focus

- To improve energy efficiency in the MSU residence halls system by employing a facility management approach which considers:

Technology

Policy and Administration

User Behaviors

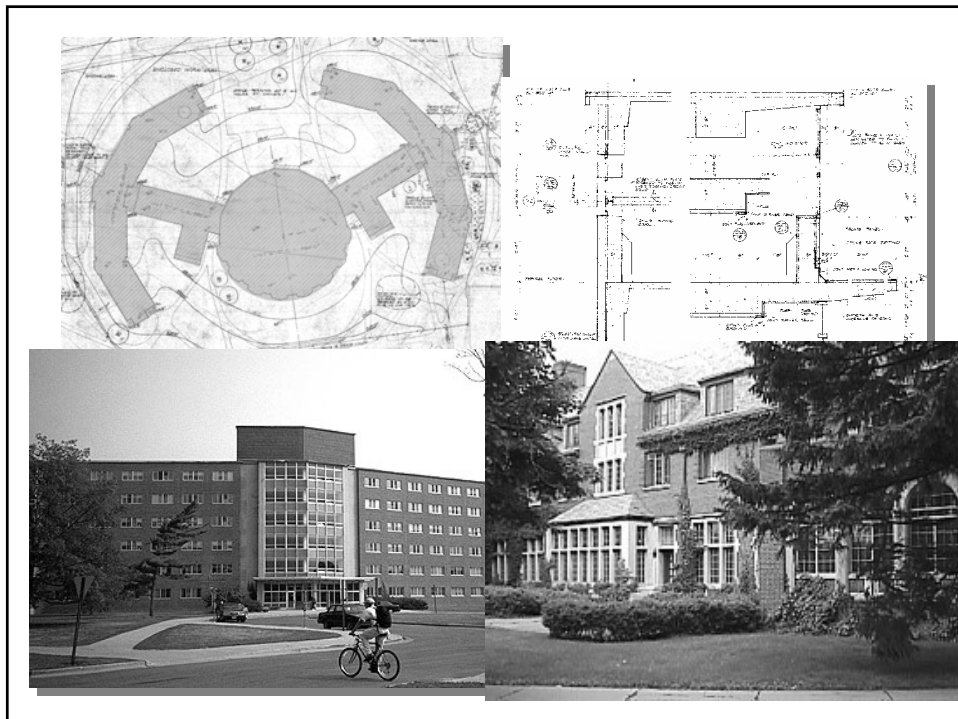
Scope of the problem

- MSU University Housing operates the largest residence hall system in the country with a capacity of 19,000 students
- 16 undergraduate halls systems and one graduate hall, (in addition, University Housing operates 3 married housing apartment villages)



Scope of the problem

- Most residence hall buildings on campus are vintage buildings at least 40 years old
- Only some have undergone energy upgrades
- Annual energy consumption for residence hall system exceeds \$ 5 million



Project Team

- Faculty and students from Construction Management Program
- Faculty and students from School of Planning, Design and Construction
- Staff from Residence Hall System
- University Staff



Project Oversight

- Energy Subcommittee of the University Committee for a Sustainable Campus (UCSC)
- Groups represented
 - Residence Hall Systems
 - Power plant/ Physical Plant
 - Engineering Services
 - UCSC
 - Purchasing
 - Faculty
 - Students

Project Sponsorship

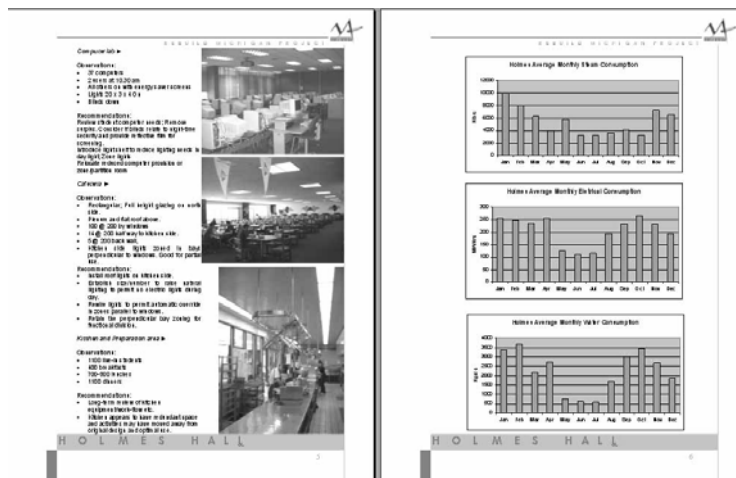
Study funded by

- Michigan Energy Office Rebuild Michigan Program via US DOE Rebuild America Program
- MSU
- Ongoing Project Since Fall of 2002
- Followed studies conducted of the MSU Natural Resources Building and the Chemistry Building by the research team

Overview of study activities

Data collection study phase

- Conducted Introductory Energy Audits of 10 buildings (3 million sf)
- Conducted walk thru audits of ten buildings
- Examined metering data for steam, electricity, and water
- Documented existing conditions
- Conducted detailed energy audit of Wonders Hall



Overview of study activities

Data collection study phase

- Interviewed staff and administrators
- Determined organizational and management structure
- Determined management practices
- Determined opportunities for physical improvements, policy changes, educational opportunities and student behavior changes

Overview of study activities

Data collection study phase

- Surveyed student users
- Conducted dorm room studies
- Determined and documented student attitudes, energy use practices, ownership and use of electrical appliances and devices

**Increasing Energy Efficiency in University Housing
Wonders Hall Student Room Energy Study**

Appliance Checklist

Appliance Inventory		Estimated Hours per/day per/week		Watt/Amps	Source
1.	Desktop computer	_____	_____	_____	_____
2.	Computer monitor	_____	_____	_____	_____
3.	Ink jet Printer or copier	_____	_____	_____	_____
4.	Laser Printer or copier	_____	_____	_____	_____
5.	Scanner or fax	_____	_____	_____	_____
6.	External drives, or other peripherals	_____	_____	_____	_____
7.	Laptop computer battery charger	_____	_____	_____	_____
8.	Cell phone charger	_____	_____	_____	_____
9.	Battery charger	_____	_____	_____	_____
10.	Television	_____	_____	_____	_____
11.	CD player or tape player	_____	_____	_____	_____
12.	Desk light or reading light	_____	_____	_____	_____
13.	Refrigerator	_____	_____	_____	_____
14.	Hot plate, grill, toaster	_____	_____	_____	_____
15.	Microwave	_____	_____	_____	_____
16.	Fan	_____	_____	_____	_____

Undergrad Survey

- Appliance Inventory
- *(Percentage of respondents Using Appliances more than 4 hours)*
 - Desktop Computer and Monitor – 89%
 - Inkjet printers – 31%
 - Laptop Computer Battery Charger – 64%
 - Cell phone charger – 68%
 - Fan – 48%
 - Refrigerator (24 hours) – 95%

Integrated user and technical studies

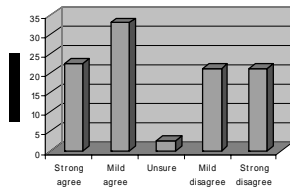
Use of student appliances accounted for approximately 1/3 of overall energy consumption in Wonders Hall

Building lighting 1/3

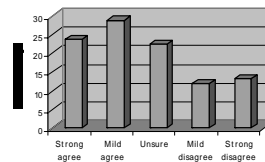
Building Services 1/3

Undergrad Survey Sample

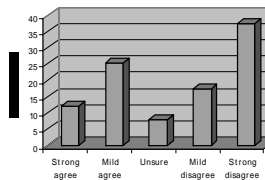
I often use the residence floor study lounges



I have enabled the power saving features of my appliances and usually use them

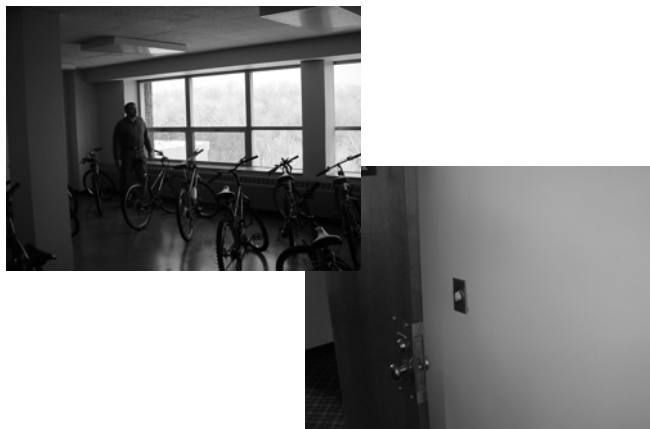


I am familiar with the "Energy Star" designation system for appliances



Recommendation Phase

- Developed recommendations for technical upgrades both low cost and capital improvement projects
- Policy and Administration
- Staff Training
- Changing User Behaviors
- Educational Programs



Student study lounges/Bike rooms – Install timers or motion sensors



LED lit exit signs



Energy monitoring room- Cafeteria and Kitchen
fan run time scheduling



Computer Labs – Downsize or eliminate with respect to usage



**Student corridors –
Change light fixtures to T8**



Maintenance rooms and workshops –
Change to Compact Fluorescents
Install timers or motion sensors



Cafeteria – Change light fixtures to T8,
Zone control for lights (make better use of natural lighting)



Entrance doorways – Weather stripping upgrades



Bathrooms – Change to automatic or low volume flush type plumbing fixtures



Vendors – Check with vendors for energy saving models for soda machines, washers and driers (Energy Star)

Implementation Activities Policy and Administration

- Gained very good acceptance of ideas from University Housing with strong support from staff and administration
- Accomplished “corporate commitment”
- University Housing became very active partner

Implementation Activities

- During the project period approximately 80 renovation projects were undertaken within the residence hall systems which upgraded energy performance
- Approximately 50 new projects are planned for the next 2-3 years
- Projects involve lighting upgrades, low volume plumbing fixtures, HVAC repairs, electrical system upgrades, roof insulation upgrades

Implementation Activities Educational

- Developed and presented staff and building manager training focused on:

Building management approaches

Low cost technology improvements
from O & M budgets

Implementation Activities Educational

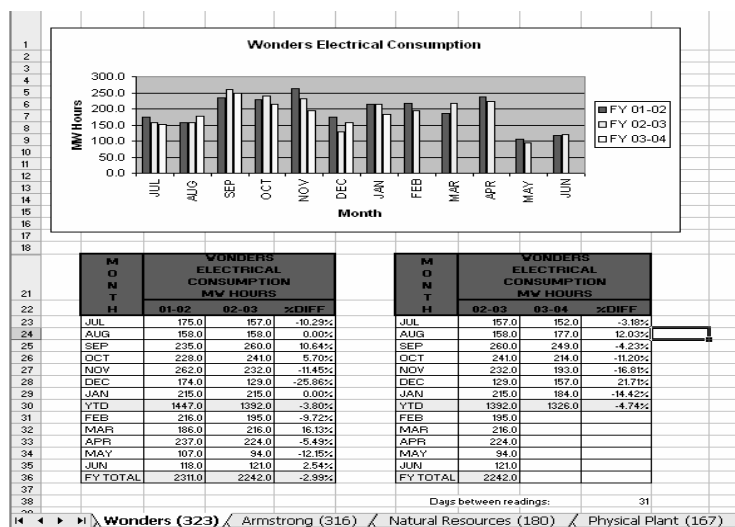
- Developed and presented “Energy Star Dorm Room” Demonstration at Parent/student summer orientation programs
- 10,000 visitors attended
- Information on www.ecofoot.msu.edu



Current Project Activities

- This year focus is on documenting Savings
- Encouraging continuing investment
- Continuing with staff training
- Continuing energy awareness activities

Any success?



Other MSU Related Activities

- **Office of Campus Sustainability**
www.ecofoot.msu.edu
- **Recent \$4 Million lighting upgrade of all classroom lighting**
- **LEED Studies**

Energy Awareness Activities Office of UCSC

Energy Conservation Success Stories

The University of California, San Diego (UCSD) has achieved a significant milestone in energy conservation by becoming the first university in the world to achieve LEED Platinum certification for its entire campus. This achievement was a result of a comprehensive energy conservation program that was implemented across the entire campus, including the installation of energy-efficient lighting, the use of renewable energy sources, and the implementation of a comprehensive energy management system.



UCSD energy conservation team members, including (from left) David L. Borenstein, David L. Borenstein, David L. Borenstein, and David L. Borenstein.

The Energy World of Wonders Hall

In addition to being a place for living and learning, Wonders Hall will soon be a place for exploring energy use on campus. A \$25,000 grant administered by the Michigan Department of Consumer and Industry Services will be used to study energy consumption in the hall, which is typical of many in the university's residence hall system. The project is one of two in Michigan funded through the U.S. Department of Energy's Rebuild America program, which is designed to promote increased energy efficiency within communities.

Back in 1963, Wonders Hall is considered a typical residence hall for that period. None of MSU's residence halls were built in the 1960s, Mrozowski says. "We believe energy consumption is affected by resident energy practices, by the building construction itself and by administrative policies," Mrozowski says. The study will gather information on energy awareness and attitudes as well as on how energy can be conserved.



People Power Drives Campaign Success

All across Michigan, a group of dedicated individuals are working to make a difference in energy conservation. This group, known as the Michigan Energy Conservation Campaign, is a coalition of organizations and individuals who are working to reduce energy consumption and promote energy efficiency. The campaign is focused on a variety of areas, including energy conservation in homes, businesses, and government buildings. The campaign is also focused on promoting energy efficiency in transportation and industry.

The University Committee for a Sustainable Campus

The University of Michigan has established a new committee to promote sustainability on campus. The committee, known as the University Committee for a Sustainable Campus, is a group of faculty, staff, and students who are working to promote sustainability on campus. The committee is focused on a variety of areas, including energy conservation, waste reduction, and sustainable transportation. The committee is also focused on promoting sustainability in the university's curriculum and research.

Thank You



Go
Spartans!